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Docket: 71553 US02

PATENT

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AUG 14 2006
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:

Adams et al.

Serial No.: 10/669,215 Group Art Unit: 1711

Filed: September 23, 2003 Examiner: D. Buttner

For: POLYESTER/POLYCARBONATE BLENDS WITH REDUCED YELLOWNESS

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Transmitted herewith in triplicate is the Appeal Brief in this application with respect to the Notice of Appeal filed April 12, 2006.

Please charge the appeal fee of $500.00 to Deposit Account No. 05-0221. The Commissioner is hereby authorized to charge any additional fees under 37 CFR 1.16 and 1.17 which may be required by this paper or credit any overpayment to Deposit Account No. 05-0221. A duplicate of this transmittal is enclosed.

Respectfully submitted,

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CERTIFICATE OF MAILING UNDER 37 CFR 1.8(a)
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Heather Ferguson
Heather Ferguson

8-10-06
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:

Serial No.:	10/669,215	Group Art Unit:	1711
Filed:	September 24, 2003	Examiner:	D. Buttner

For: POLYESTER/POLYCARBONATE BLENDS WITH REDUCED YELLOWNESS

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

This is an appeal from the final rejection of the Examiner dated October 12, 2005, rejecting claims 1-26 and 28-42. This Brief is accompanied by the requisite fee set forth in 37 C.F.R. § 41.20(b)(2).

REAL PARTY IN INTEREST

The real party in interest is Eastman Chemical Company.

RELATED APPEALS AND INTERFERENCES

There are no other prior or pending appeals, interferences, or judicial proceedings known to Appellants, Appellants' legal representative, or assignee that may be related to, directly affect or be directly affected by, or have a bearing on the Board's decision in the pending appeal.

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STATUS OF CLAIMS

Claims 1-26 and 28-42 stand rejected and are under appeal. Claims 27 and 43-45 have been canceled. A copy of the claims involved in the appeal is attached in the Claims Appendix.

STATUS OF AMENDMENTS

There are no amendments filed subsequent to final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

There are six independent claims involved in the appeal.

Independent claim 1 relates to a thermoplastic composition comprising a compounded blend of a polyester and a polycarbonate. The polyester is prepared in the presence of a titanium-containing catalyst compound in an amount of from about 1 to about 30 ppm elemental titanium, with ppm based on the total weight of the polyester. Optionally, an ester exchange catalyst in an amount of from about 1 to about 150 ppm of an active element is utilized when the acid component of the polyester is derived from a diester of the dicarboxylic acid. Page 4, line 28 - page 29, line 5.

Independent claim 8 relates to a thermoplastic composition comprising a polymer mixture of from about 1 to about 99 weight percent of a polyester and from about 99 to about 1 weight percent of a polycarbonate. The polyester comprises residues of (i) a titanium-containing catalyst compound in an amount of from about 1 to about 30 ppm elemental titanium, (ii) a pre-polycondensation phosphorus-containing compound in an amount of from about 1 to about 150 ppm elemental phosphorus, and (iii) optionally, an ester exchange catalyst in an amount of from about 1 to about 150 ppm of an active element utilized when the acid component is derived from a diester of the dicarboxylic acid, with ppm based on the total weight of the polyester. Page 5, lines 6-16.

Independent claim 22 relates to a thermoplastic composition comprising a miscible blend of:

(a) about 1 to about 99 weight percent of a polyester comprising:

(i) an acid component comprising repeat units from about 80 to 100 mole percent terephthalic acid, isophthalic acid, naphthalenedicarboxylic acid, 1,4-cyclohexanedicarboxylic acid or mixtures thereof and from 0 to about 20 mole percent of other dicarboxylic acid units having from about 4 to about 40 carbon atoms, wherein the total mole percent of the acid component is equal to 100 mole percent,

and

(ii) a diol component comprising repeat units from about 40 to 100 mole percent 1,4-cyclohexanedimethanol, from 0 to about 60 mole percent ethylene glycol, and from 0 to about 20 mole percent of other diol units having from 3 to about 12 carbon atoms, wherein the total mole percent of diol component is equal to 100 mole percent;

and

(b) about 99 to about 1 weight percent of a polycarbonate of 4,4-isopropylidenediphenol. Page 5, line 17 - page 6, line 6.

The polyester comprises (i) catalyst residues of a titanium-containing catalyst compound in an amount of from about 1 to about 20 ppm elemental titanium, (ii) catalyst residues of a pre-polycondensation phosphorus-containing compound in an amount of from about 1 to about 150 ppm elemental phosphorus, (iii) from about 1 to about 10 ppm of at least one copolymerizable compound of a 6-arylamino-1-cyano-3H-dibenz[f,ij]isoquinoline-2,7-dione or a 1,4-bis(2,6-dialkylanilino) anthraquinone in combination with at least one bis anthraquinone or bis anthrapyridone(6-arylamino-3H-dibenz[f,ij]isquinoline-2,7-done) compound, wherein the compounds contain at least one polyester reactive group; and (iv) optionally, an ester exchange catalyst in an amount of from about 1 to about 150 ppm of an active element utilized when the acid component is derived from a diester of the dicarboxylic acid, with ppm based on the total weight of the polyester. Page 6, lines 7-20.

Independent claim 30 relates to a thermoplastic composition comprising a miscible blend of from about 1 to about 99 weight percent of a polyester comprising an acid component comprising repeat units from terephthalic acid, isophthalic acid, and mixtures thereof and a diol component comprising repeat units from about 40 to 100 mole percent 1,4-cyclohexanedimethanol and about 0 to about 60 mole percent ethylene glycol, based on 100 mole percent acid component and 100 mole percent diol component, and from about 99 to about 1 weight percent of a polycarbonate of 4,4-isopropylidenediphenol. Page 6, lines 21-29.

The polyester is prepared in the presence of a catalyst consisting essentially of (i) a titanium-containing catalyst compound in an amount of about 1 to about 15 ppm elemental titanium, (ii) a pre-polycondensation phosphorus-containing compound in an amount of about 45 to about 100 ppm elemental phosphorus, (iii) from about 1 to about 5 ppm of at least one copolymerizable compound of a 6-arylamino-1-cyano-3H-dibenz[f,ij]isoquinoline-2,7-dione or a 1,4-bis(2,6-dialkylanilino) anthraquinone in combination with at least one bis anthraquinone or bis anthrapyridone(6-arylamino-3H-dibenz[f,ij]isquinoline-2,7-done) compound, wherein the compounds contain at least one polyester reactive group, and (iv) optionally, an ester exchange catalyst in an amount of from about 10 to about 65 ppm of an active element utilized when the acid component is derived from a diester of the dicarboxylic acid, with ppm based on the total weight of the polyester. Page 7, lines 1-15.

The miscible blend comprises from about 0.05 to about 0.15 weight percent of a post-polycondensation phosphorus-containing compound selected from the group consisting of an aliphatic phosphite compound, aromatic phosphite compound, or a mixture thereof, based on the total weight percent of the blend. Page 7, lines 17-22.

Independent claim 31 relates to a process for preparing a blend of a polyester and a polycarbonate. The process comprises the steps of:

(a) producing a polyester comprising the steps of:

(i) reacting 100 mole percent of a diacid, or ester derivative thereof, of at least one aromatic, aliphatic, or alicyclic dicarboxylic acid, wherein the aromatic portion of said aromatic dicarboxylic acid has 6-20 carbon atoms and wherein the aliphatic or alicyclic portion of said aliphatic or alicyclic dicarboxylic acid has 3-20 carbon atoms, and 100 mole percent of a diol comprising at least one aliphatic, aliphatic ether, or cycloaliphatic diol having 2-20 carbon atoms at a temperature and pressure sufficient to effect esterification for the diacid or ester exchange for the ester derivative;

and

(ii) polycondensing the product of step (i) at temperatures and pressures sufficient to effect polycondensation in the presence of a titanium-containing catalyst compound in an amount of from about 1 to about 30 ppm elemental titanium, with ppm based on the total weight of the polyester;

and

(b) compounding from about 1 to about 99 weight percent of the polyester of step (a) with from about 99 to about 1 weight percent of a polycarbonate to form a blend, with the weight percent based on the total weight percent of the blend. Page 7, line 22 - page 8, line 15.

And independent claim 39 relates to a process for preparing a thermoplastic composition. The process comprises the step of compounding:

(a) from about 1 to about 99 weight percent of a polyester comprising:

(i) an acid component comprising repeat units from about 80 to 100 mole percent terephthalic acid, isophthalic acid, and mixtures thereof, based on 100 mole percent acid component;

(ii) a diol component comprising repeat units from about 40 to 100 mole percent 1,4-cyclohexanedimethanol and about 0 to about 60 mole percent ethylene glycol, based on 100 mole percent diol component;

and

(iii) residues of a titanium-containing catalyst compound in an amount of from about 1 to about 20 ppm elemental titanium, a pre-polycondensation phosphorus-containing compound in an amount of from about 1 to about 100 ppm elemental phosphorus, and optionally, an ester exchange catalyst in an amount of from about 1 to about 150 ppm of an active element utilized when the acid component is derived from a diester of the dicarboxylic acid, with ppm based on the total weight of the polyester;

and

(b) from about 99 to about 1 weight percent of a polycarbonate. Page 8, line 16 - page 9, line 8.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

There are four grounds of rejection to be reviewed. Those grounds are

1. Claims 1-4, 7-10, 12, 15-20, 31-37, 39-40, and 42 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 5,106,944 to Sublett;

2. Claims 1-4, 7-10, 12, 15-20, 31-37, 39-40, and 42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sublett in view of U.S. Patent No. 5,922,816 to Hamilton or W.A. Smith et al., "Chemistry of Miscible Polycarbonate-Copolyester Blends, *J. App. Polymer Sci.*, Vol. 26, 4233-4245 (1981) ("Smith");

3. Claims 1-10, 12-20, 31-40, and 42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sublett in view of in view of U.S. Patent No. 5,254,610 to Small, Jr. et al. ("Small") optionally in further view of Hamilton or Smith; and

4. Claims 1-13, 15-26, 28-37, and 39-42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,786,692 to Allen et al. ("Allen") in view of U.S. Patent No. 5,886,133 to Hilbert et al. ("Hilbert").

ARGUMENT

Ground of Rejection 1

Claims 1-4, 7-10, 12, 15-20, 31-37, 39-40, and 42 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Sublett. For purposes of this appeal, claim 1 is representative of the rejected group of claims.

The rejection should be reversed because Sublett does not disclose or suggest each feature of claim 1. For example, Sublett fails to disclose or suggest a polyester-polycarbonate blend where the polyester is prepared in the presence of a titanium catalyst in an amount of about 1-30 ppm elemental Ti.

In contrast to the present claim 1, Sublett discloses using a catalyst system comprising a complex of titanium alkoxide with an alkali or alkaline earth metal salt where the titanium is present in an amount of 10-100 ppm. Col. 2, lines 15-20. While there is overlap between Appellants' claimed range and Sublett's range, Appellants' claimed range can provide blends with reduced yellowness and increased thermal and melt stability, which are neither taught nor suggested by Sublett. See Examples 1-4 and Tables 2-4 in the instant application.

Example 1 in the instant application is a comparison of the yellowness in polyester (PES) #2/polycarbonate (PC) blends compared to PES #1/PC blends. Page 30, lines 2-4. Both PES's were made from terephthalic acid (TA) with 30 mole% of 1,4-cyclohexanedimethanol (CHDM) and 70 mole% of ethylene glycol (EG). Page 29, lines 14-16 and Table 1. Both PES's have nearly identical inherent viscosities. PES #1, however, has a Ti content of 54 ppm (outside claimed range), while PES #2 has a Ti content of 16 ppm (inside claimed range). See Table 1. Table 2 shows the b* values (indicating yellowness) of pellets and plaques made from the blends. As seen from Table 2, blends containing PES #2 have reduced yellowness compared to blends containing PES #1 at equivalent concentrations. Page 31, lines 10-18.

Example 2 in the instant application is a comparison of the yellowness in PES #4/PC blends compared to PES #3/PC blends. Page 33, lines 2-4. Both PES's were made from TA with 60 mole% of CHDM and 40 mole% of EG. Page 29, lines 14-16 and Table 1. Both PES's have nearly identical inherent viscosities. PES #3, however, has a Ti content of 51 ppm (outside claimed range), while PES #4 has a Ti content of 12 ppm (inside claimed range). See Table 1. Table 3 shows the b* values (indicating yellowness) of pellets and plaques made from the blends. As seen from Table 3, blends containing PES #4 have reduced yellowness compared to blends containing PES #3 at equivalent concentrations. Page 33, lines 21-29.

Example 3 in the instant application is a comparison of the thermal stability of PES #4/PC blends compared to PES #3/PC blends. Page 36, lines 2-4. For each blend, the composition was heated at 280°C for 20 minutes and the percentage of weight loss was recorded. A lower weight loss signifies improved thermal stability. As

seen in the table on page 36, blends with PES #4 show less weight loss or greater thermal stability than blends with PES #3 at equivalent concentrations. Page 36, lines 17-19.

Example 4 in the instant application is a comparison of the melt stability of PES #4/PC blends compared to PES #3/PC blends. Page 36, lines 2-4. For each blend, the viscosity was measured as a function of time for 30 minutes in air in a rheometer. Page 37, lines 12-16. A lower percentage change in viscosity over time indicates improved melt stability. As seen in Table 4, blends with PES #4 show a smaller change in viscosity or greater melt stability than blends with PES #3 at equivalent concentrations. Page 37, lines 20-23.

In addition to reduced yellowness and increased thermal and melt stability, the blends of the present invention require lower levels of a stabilizer to achieve further color reductions. Example 5 in the instant application compares the b* values of PC blends with PES's #1, #2, #3, and #4. As seen from Table 5, at each level of stabilizer loading, the blends with PES #2 and #4, which have a Ti content between 1-30 ppm, have a lower b* value than the blends with PES #1 and #3, which have a Ti content outside the claimed range.

Thus, as seen from Examples 1-5 of the instant application, the blends of the present invention can provide less color, yet greater thermal and melt stability compared to blends with higher concentrations of Ti. Sublett does not disclose or suggest such benefits from the use of Ti concentrations in the range of 1-30 ppm.

The Examiner, however, criticizes the data as not being a comparison with the closest prior art of Sublett. According to the Examiner, the data are not convincing because they do not include a comparison with a catalyst containing an alkali/alkaline earth metal called for by Sublett. *Final Office Action* at 5. The Examiner's position, however, is untenable because Appellants may compare the claimed invention with prior art that is more closely related to the invention than the prior art relied upon by the Examiner. See MPEP § 716.02(e)(I) at 700-272 (citing *In re Holladay,* 584 F.2d 384 (CCPA 1978) and *Ex parte Humber*, 217 USPQ 265 (Bd. App. 1961)).

In this case, the comparative blends are more closely related to the claimed invention than the Sublett composition. In Examples 1-5, the only significant difference in the blends is the Ti concentration. Polyesters 1 and 3 have Ti concentrations outside the claimed range, while Polyesters 2 and 4 have Ti concentrations within the claimed range. On the other hand, the polyester of Sublett further differs from Polyesters 2 and 4 of the claimed invention by additionally using an alkali or alkaline earth metal salt. Since Polyesters 1 and 3 are closer to Polyesters 2 and 4 of the claimed invention than the polyester of Sublett, the comparative data in Tables 2-5 can be used to show unexpected results of the claimed invention.

In sum, the rejection based on Sublett should be reversed because Sublett does not disclose or suggest each feature of representative claim 1.

Ground of Rejection 2

Claims 1-4, 7-10, 12, 15-20, 31-37, 39-40, and 42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sublett in view of Hamilton or Smith. For purposes of this appeal, claim 1 is representative of the rejected group of claims.

The rejection should be reversed because Hamilton and Smith do not remedy the deficiencies of Sublett. The deficiencies of Sublett have been noted above. They include the lack of disclosure for using 1-30 ppm of Ti.

With regard to the secondary references, Appellants agree with the Examiner that both Hamilton and Smith discuss the negative effects of residual polyester catalysts. However, Appellants disagree with the Examiner's conclusion drawn from these references. The Examiner alleges that to minimize these problems, persons skilled in the art would choose lower amounts of catalyst when producing the polyester. However, as both Hamilton and Smith demonstrate, that's not a choice that persons skilled in the art would have made. Rather than minimizing the amount of catalysts, Hamilton teaches using a silyl phosphate to deactivate the catalyst. Col. 2, lines 43-49. Similarly, Smith discloses using a complexing agent to deactivate the catalyst. Page 4233, last paragraph. Thus, Hamilton and Smith cannot be relied upon to suggest using

low amounts of titanium catalyst. Even if they could be, the data in Tables 2-5 of the instant application, as discussed above, rebut any *prima facie* case of obviousness.

As a result, the rejection based on Sublett in view of Hamilton or Smith should be reversed.

Ground of Rejection 3

Claims 1-10, 12-20, 31-40, and 42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sublett in view of in view of Small optionally in further view of Hamilton or Smith. For purposes of this appeal, claim 1 is representative of the rejected group of claims.

The rejection should be reversed because Small does not remedy the deficiencies of Sublett, Hamilton, and Smith. Those deficiencies have been noted above. They include the lack of a disclosure or suggestion for using 1-30 ppm of Ti.

Small was only cited in connection with the use of phosphates. *Final Office Action* at 3. Thus, Small does not remedy the deficiency regarding the use of 1-30 ppm of Ti. As a result, the rejection based on Sublett in view of Small optionally in further view of Hamilton or Smith should be reversed.

Ground of Rejection 4

Claims 1-13, 15-26, 28-37, and 39-42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Allen in view of Hilbert. For purposes of this appeal, claim 1 is representative of the rejected group of claims.

The rejection should be reversed because Hilbert cannot be properly combined with Allen.

Allen does not disclose or suggest each feature of representative claim 1. For example, Allen fails to disclose or suggest a polyester-polycarbonate blend where the polyester is prepared in the presence of a titanium catalyst in an amount of about 1-30 ppm elemental Ti. In fact, no amount of Ti catalyst is mentioned at all.

To remedy the deficiency of Allen, the Examiner relies on Hilbert. But Hilbert cannot be properly combined with Allen because there is no suggestion or motivation to

combine their respective teachings. Allen is directed to a blend of an aromatic polycarbonate and an amorphous copolyester. Col. 3, lines 50-53; col. 5, lines 7-11. On the other hand, Hilbert is directed to a process for preparing crystalline polyethylene terephthalate (PET). Col. 3, lines 35-37. Amorphous polymers are recognized in the art to be different from crystalline polymers, with different properties. For example, amorphous polymers are known for their transparency, while crystalline polymers are known for their strength. See Alger, *Polymer Science Dictionary*, 18, 95 (1989) (copy attached in Evidence Appendix). Since Allen and Hilbert are directed to different kinds of polyesters, one skilled in the art looking to modify Allen would not have drawn upon the teachings of Hilbert. Rather, such persons would have looked to more closely related art in the field of amorphous polyesters.

In the final Office Action, the Examiner dismisses this distinction, saying that Hilbert "makes the same polyester as called for by Allen". But as discussed above, Hilbert does not make the "same polyester" as Allen. Hilbert makes a crystalline polyester, while Allen makes an amorphous one. Even though the polyester of Hilbert can contain components common to the polyester of Allen, their proportions are different. For example, in Allen, the ethylene glycol (EG) content ranges from 20 to 80 mole% (col. 4, lines 25-28), while the EG content in Hilbert must be at least 65 mole% (col. 2, lines 47-48). Thus, it would not have been readily apparent to persons skilled in the art that the method of making polyesters in Hilbert would be applicable to making the polyesters of Allen.

Even if Hilbert could properly be combined with Allen, any *prima facie* case of obviousness based on these references has been rebutted by the unexpected results shown in Examples 1-5 and Tables 2-5 of the instant application and discussed above.

Accordingly, the rejection based on Allen and Hilbert should be reversed.

CONCLUSION

For the foregoing reasons, the rejections in the Final Office Action should be reversed.

Respectfully submitted,

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Heather Ferguson

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8-10-06

Date

CLAIMS APPENDIX

Claim 1 (previously presented): In a thermoplastic composition comprising a compounded blend of a polyester and a polycarbonate, the improvement comprising preparing the polyester in the presence of a titanium-containing catalyst compound in an amount of from about 1 to about 30 ppm elemental titanium and, optionally, an ester exchange catalyst in an amount of from about 1 to about 150 ppm of an active element utilized when an acid component of the polyester is derived from a diester of a dicarboxylic acid, with ppm based on the total weight of the polyester.

Claim 2 (original): The thermoplastic composition of claim 1 wherein the titanium-containing catalyst compound is present in an amount of from about 1 to about 20 ppm elemental titanium.

Claim 3 (original): The thermoplastic composition of claim 1 wherein the titanium-containing catalyst compound is present in an amount of from about 1 to about 15 ppm elemental titanium.

Claim 4 (original): The thermoplastic composition of claim 1 wherein the compounded blend further comprises a post-polycondensation phosphorus-containing compound in an amount of from about 0.01 to about 500 ppm elemental phosphorus, with ppm based on the total weight of the compounded blend.

Claim 5 (original): The thermoplastic composition of claim 4 wherein the phosphorus-containing compound is added after polycondensation in the preparation of the polyester and is present in an amount of from about 10 to about 350 ppm.

Claim 6 (original): The thermoplastic composition of claim 5 wherein the phosphorus-containing compound is present in an amount of from about 50 to about 150 ppm.

Claim 7 (original): The thermoplastic composition of claim 1 wherein the compounded blend further comprises a phosphorus-containing compound present in an amount of from about 10 to about 100 ppm, based on the weight of the polyester, and added during the preparation of the polyester prior to polycondensation.

Claim 8 (original): In a thermoplastic composition comprising a polymer mixture of from about 1 to about 99 weight percent of a polyester and from about 99 to about 1 weight percent of a polycarbonate, the improvement comprising the polyester comprising residues of (i) a titanium-containing catalyst compound in an amount of from about 1 to about 30 ppm elemental titanium, (ii) a pre-polycondensation phosphorus-containing compound in an amount of from about 1 to about 150 ppm elemental phosphorus and (iii) optionally, an ester exchange catalyst in an amount of from about 1 to about 150 ppm of an active element utilized when the acid component is derived from a diester of the dicarboxylic acid, with ppm based on the total weight of the polyester.

Claim 9 (original): The thermoplastic composition of claim 8 wherein the titanium-containing catalyst compound is present in an amount of from about 1 to about 20 ppm elemental titanium.

Claim 10 (original): The thermoplastic composition of claim 8 wherein the titanium-containing catalyst compound is present in an amount of from about 1 to about 15 ppm elemental titanium.

Claim 11 (original): The thermoplastic composition of claim 8 wherein the polyester further comprises residues of about 1 to about 10 ppm of at least one copolymerizable compound of a 6-arylamino-1-cyano-3H-dibenz[f,ij]isoquinoline-2,7-dione or a 1,4-bis(2,6-dialkylanilino) anthraquinone in combination with at least one bis anthraquinone or bis anthrapyridone(6-arylamino-3H-dibenz[f,ij]isoquinoline-2,7-done) compound, wherein the compounds contain at least one polyester reactive group.

Claim 12 (original): The thermoplastic composition of claim 8 wherein the polymer mixture further comprises about from 0.01 to about 0.35 weight percent of a post-polycondensation phosphorus-containing compound, based on the total weight of the polymer mixture.

Claim 13 (original): The thermoplastic composition of claim 12 wherein the post-polycondensation phosphorus-containing compound is present in an amount of from about 0.05 to about 0.15 weight percent..

Claim 14 (original): The thermoplastic composition of claim 12 wherein the post-polycondensation phosphorus-containing compound is distearyl pentaerythritol diphosphite.

Claim 15 (original): The thermoplastic composition of claim 8 wherein the polymer mixture is a compounded blend.

Claim 16 (original): A molded article formed from the thermoplastic composition of claim 8.

Claim 17 (original): A film or sheet formed from the thermoplastic composition of claim 8.

Claim 18 (original): The thermoplastic composition of claim 8 wherein the polyester comprises (a) an acid component comprising repeat units from at least one aromatic, aliphatic, or alicyclic dicarboxylic acid, wherein the aromatic portion of said aromatic dicarboxylic acid has 6-20 carbon atoms and wherein the aliphatic or alicyclic portion of said aliphatic or alicyclic dicarboxylic acid has 3-20 carbon atoms, and b) a diol component comprising repeat units from at least one aliphatic, aliphatic ether, or cycloaliphatic diol having 2-20 carbon atoms.

Claim 19 (original): The thermoplastic composition of claim 18 wherein the acid component comprises repeat units from about 80 to 100 mole percent terephthalic acid, isophthalic acid, naphthalenedicarboxylic acid, 1,4-cyclohexanedicarboxylic acid or mixtures thereof and from 0 to about 20 mole percent of other dicarboxylic acid units having from about 4 to about 40 carbon atoms; and the diolcomponent comprises repeat units from about 40 to 100 mole percent 1,4-cyclohexanedimethanol, from 0 to about 60 mole percent ethylene glycol, and from 0 to about 20 mole percent of other diol units having from 3 to about 12 carbon atoms; wherein the total mole percent of the acid component is equal to 100 mole percent and the total mole percent of the diol component is equal to 100 mole percent.

Claim 20 (original): The thermoplastic composition of claim 19 wherein the polyester comprises from about 95 to 100 mole percent of terephthalic acid, from about 58 to about 66 mole percent 1,4-cyclohexanedimethanol and from about 42 to about 34 mole percent of ethylene glycol.

Claim 21 (original): The thermoplastic composition of claim 19 wherein the polyester comprises 100 mole percent 1,4-cyclohexanedimethanol, from about 22 to about 30 mole percent isophthalic acid, and from about 78 to about 70 mole percent terephthalic acid.

Claim 22 (previously presented): In a thermoplastic composition comprising a miscible blend of:

(a) about 1 to about 99 weight percent of a polyester comprising:

(i) an acid component comprising repeat units from about 80 to 100 mole percent terephthalic acid, isophthalic acid, naphthalenedicarboxylic acid, 1,4-cyclohexanedicarboxylic acid or mixtures thereof and from 0 to about 20 mole percent of other dicarboxylic acid units having from about 4 to about 40 carbon atoms, wherein the total mole percent of the acid component is equal to 100 mole percent,

and

(ii) a diol component comprising repeat units from about 40 to 100 mole percent 1,4-cyclohexanedimethanol, from 0 to about 60 mole percent ethylene glycol, and from 0 to about 20 mole percent of other diol units having from 3 to about 12 carbon atoms, wherein the total mole percent of diol component is equal to 100 mole percent;

and

(b) about 99 to about 1 weight percent of a polycarbonate of 4,4-isopropylidenediphenol;

the improvement comprising the polyester comprising (i) catalyst residues of a titanium-containing catalyst compound in an amount of from about 1 to about 20 ppm elemental titanium, (ii) catalyst residues of a pre-polycondensation phosphorus-containing compound in an amount of from about 1 to about 150 ppm elemental phosphorus , (iii) from about 1 to about 10 ppm of at least one copolymerizable compound of a 6-arylamino-1-cyano-3H-dibenz[f,ij]isoquinoline-2,7-dione or a 1,4-bis(2,6-dialkylanilino) anthraquinone in combination with at least one bis anthraquinone or bis anthrapyridone(6-arylamino-3H-dibenz[f,ij]isquinoline-2,7-done) compound, wherein the compounds contain at least one polyester reactive group; and (iv) optionally, an ester exchange catalyst in an amount of from about 1 to about 150 ppm of an active element utilized when the acid component is derived from a diester of the dicarboxylic acid, with ppm based on the total weight of the polyester.

Claim 23 (original): The thermoplastic composition of claim 22 wherein the polyester comprises from about 95 to 100 mole percent of terephthalic acid, from about 58 to about 66 mole percent 1,4-cyclohexanedimethanol and from about 42 to about 34 mole percent of ethylene glycol.

Claim 24 (original): The thermoplastic composition of claim 22 wherein the polyester comprises 100 mole percent 1,4-cyclohexanedimethanol, from about 22 to

about 30 mole percent isophthalic acid, and from about 78 to about 70 mole percent terephthalic acid.

Claim 25 (original): The thermoplastic composition of claim 22 wherein the titanium-containing catalyst compound is present in an amount of from about 1 to about 15 ppm elemental titanium.

Claim 26 (original): The thermoplastic composition of claim 22 wherein the thermoplastic composition further comprises about from 0.01 to about 0.35 weight percent of a post-polycondensation phosphorus-containing compound, based on the total weight of the blend.

Claim 27 (canceled)

Claim 28 (original): A molded article formed from the thermoplastic composition of claim 22.

Claim 29 (original): A film or sheet formed from the thermoplastic composition of claim 22.

Claim 30 (original): In a thermoplastic composition comprising a miscible blend of from about 1 to about 99 weight percent of a polyester comprising an acid component comprising repeat units from terephthalic acid, isophthalic acid, and mixtures thereof and a diol component comprising repeat units from about 40 to 100 mole percent 1,4-cyclohexanedimethanol and about 0 to about 60 mole percent ethylene glycol, based on 100 mole percent acid component and 100 mole percent diol component, and from about 99 to about 1 weight percent of a polycarbonate of 4,4-isopropylidenediphenol, the improvement comprising:

(1) preparing the polyester in the presence of a catalyst consisting essentially of (i) a titanium-containing catalyst compound in an amount of about 1 to about

15 ppm elemental titanium, (ii) a pre-polycondensation phosphorus-containing compound in an amount of about 45 to about 100 ppm elemental phosphorus , (iii) from about 1 to about 5 ppm of at least one copolymerizable compound of a 6-arylamino-1-cyano-3H-dibenz[f,ij]isoquinoline-2,7-dione or a 1,4-bis(2,6-dialkylanilino) anthraquinone in combination with at least one bis anthraquinone or bis anthrapyridone(6-arylamino-3H-dibenz[f,ij]isoquinoline-2,7-done) compound, wherein the compounds contain at least one polyester reactive group, and (iv) optionally, an ester exchange catalyst in an amount of from about 10 to about 65 ppm of an active element utilized when the acid component is derived from a diester of the dicarboxylic acid, with ppm based on the total weight of the polyester;

and

(2) the miscible blend comprising from about 0.05 to about 0.15 weight percent of a post-polycondensation phosphorus-containing compound selected from the group consisting of an aliphatic phosphite compound, aromatic phosphite compound or a mixture thereof, based on the total weight percent of the blend.

Claim 31 (original): A process for preparing a blend of a polyester and a polycarbonate comprising the steps of:

(a) producing a polyester comprising the steps of:

(i) reacting 100 mole percent of a diacid, or ester derivative thereof, of at least one aromatic, aliphatic, or alicyclic dicarboxylic acid, wherein the aromatic portion of said aromatic dicarboxylic acid has 6-20 carbon atoms and wherein the aliphatic or alicyclic portion of said aliphatic or alicyclic dicarboxylic acid has 3-20 carbon atoms, and 100 mole percent of a diol comprising at least one aliphatic, aliphatic ether, or cycloaliphatic diol having 2-20 carbon atoms at a temperature and pressure sufficient to effect esterification for the diacid or ester exchange for the ester derivative;

and

(ii) polycondensing the product of step (i) at temperatures and pressures sufficient to effect polycondensation in the presence of a titanium-containing catalyst compound in an amount of from about 1 to about 30 ppm elemental titanium, with ppm based on the total weight of the polyester;

and

(b) compounding from about 1 to about 99 weight percent of the polyester of step (a) with from about 99 to about 1 weight percent of a polycarbonate to form a blend, with the weight percent based on the total weight percent of the blend.

Claim 32 (original): The process of claim 31 wherein the titanium-containing compound of step (a)(ii) is present in an amount of from about 1 to about 20 ppm elemental titanium.

Claim 33 (original): The process of claim 31 wherein the titanium-containing compound of step (a)(ii) is present in an amount of from about 1 to about 15 ppm elemental titanium.

Claim 34 (original): The process of claim 31 wherein a pre-polycondensation phosphorus-containing compound is added to step (a)(ii) in an amount of from about 1 to about 150 ppm elemental phosphorus.

Claim 35 (original): The process of claim 31 wherein the diacid comprises from about 80 to about 100 mole percent terephthalic acid, isophthalic acid, or mixtures thereof and the diol comprises from about 40 to 100 mole percent 1,4-cyclohexanedimethanol and about 0 to about 60 mole percent ethylene glycol, based on 100 mole percent diacid and 100 mole percent diol.

Claim 36 (original): The process of claim 31 wherein step (b) a post-polycondensation phosphorus-containing compound is compounded with the polyester and the polycarbonate at an amount of from about 0.1 to about 0.35 weight percent based on the total weight percent of the blend.

Claim 37 (original): The process of claim 31 wherein step (b) a post-polycondensation phosphorus-containing compound is compounded with the polyester and the polycarbonate at an amount of about 0.05 to about 0.15 weight percent based on the total weight percent of the blend.

Claim 38 (original): The thermoplastic composition of claim 37 wherein the post-polycondensation phosphorus-containing compound is distearyl pentaerythritol diphosphite.

Claim 39 (original): A process for preparing a thermoplastic composition comprising the step of compounding:

(a) from about 1 to about 99 weight percent of a polyester comprising:

(i) an acid component comprising repeat units from about 80 to 100 mole percent terephthalic acid, isophthalic acid, and mixtures thereof, based on 100 mole percent acid component;

(ii) a diol component comprising repeat units from about 40 to 100 mole percent 1,4-cyclohexanedimethanol and about 0 to about 60 mole percent ethylene glycol, based on 100 mole percent diol component;

and

(iii) residues of a titanium-containing catalyst compound in an amount of from about 1 to about 20 ppm elemental titanium, a pre-polycondensation phosphorus-containing compound in an amount of from about 1 to about 100 ppm elemental phosphorus , and optionally, an ester exchange catalyst in an amount of from about 1 to about 150 ppm of an active element utilized when the acid component is derived from a diester

of the dicarboxylic acid, with ppm based on the total weight of the polyester.

and

(b) from about 99 to about 1 weight percent of a polycarbonate.

Claim 40 (original): The process of claim 39 wherein the polyester comprises from about 95 to 100 mole percent of terephthalic acid, from about 58 to about 66 mole percent 1,4-cyclohexanedimethanol and from about 42 to about 34 mole percent of ethylene glycol.

Claim 41 (original): The process of claim 39 wherein the polyester comprises 100 mole percent 1,4-cyclohexanedimethanol, from about 22 to about 30 mole percent isophthalic acid, and from about 78 to about 70 mole percent terephthalic acid.

Claim 42 (original): The process of claim 39 wherein the titanium-containing compound is present in an amount of from about 1 to about 15 ppm elemental titanium.

Claims 43-45 (canceled)

EVIDENCE APPENDIX

Alger, *Polymer Science Dictionary*, 18, 95 (1989)

RELATED PROCEEDINGS APPENDIX

None.

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network form. Aminoresins are important commercial polymers, being widely used as thermosetting plastic moulding and laminating resins, in coatings and varnishes and as textile (especially cotton textile) finishes. The most important types are urea–formaldehyde and melamine–formaldehyde polymers. Of lesser importance are benzoguanamine—formaldehyde, aniline–formaldehyde and other urea–formaldehyde resins such as thiourea, cyclic ureas, e.g. ethyleneurea, and dicyanamide–formaldehyde resins. The initially formed polymers are often condensed methylol derivatives of the amines or amides with methylene bridges (in urea–formaldehydes) and/or ether methylene bridges, as in melamine–formaldehydes. The prepolymer, after fabrication, may then be crosslinked to form a network thermoset plastic product.

AMINOSILANE A silane coupling agent containing amino groups. Examples include γ-aminopropyltrimethoxysilane and *N*-β-(aminoethyl)-γ-aminopropyltrimethoxysilane.

AMINOSUGAR A monosaccharide (or sugar) or monosaccharide unit in which a hydroxyl group has been replaced by an amino group or by an *N*-acetyl-amino group (—$NHCOCH_3$). In their nomenclature the aminosugars are formally regarded as being formed via the deoxysugar. Thus common naturally occurring examples (mostly in animals and micro-organisms) are D-glucosamine (or 2-deoxy-2-amino-D-glucose), D-galactosamine (or 2-deoxy-2-amino-D-galactose) and its acetylated derivative sialic acid.

11-(or ω-)AMINOUNDECANOIC ACID Alternative name for 11-aminoundecylenic acid.

11-(or ω-)AMINOUNDECYLENIC ACID (11-(or ω-) Aminoundecanoic acid)

$H_2N(CH_2)_{10}COOH$ M.p. 187–191°C.

The monomer for nylon 11. Obtained from castor oil, by methanolysis to methyl ricinoleate, which is pyrolysed to methyl undecylenate; the hydrolysed ester is converted to 11-bromoundecylenic acid, which is finally reacted with ammonia to give the desired monomer. Polymerised to nylon 11 (together with about 0·5% lactam in equilibrium) by heating at about 215°C.

AMMONIA CELLULOSE Alternative name for cellulose III.

AMORPHOUS DEFECT A disordered region either within, or on, the surface of a crystal; of no specified structure, but intermediate between the well-defined line, e.g. dislocation, or point defects and the amorphous phase structure. Postulated in order to account for the large loss in crystallinity on introduction of small amounts of comonomer (or other structural impurity) into the polymer chains.

AMORPHOUS ORIENTATION The component of the overall orientation due to the amorphous regions in a polymer. There will similarly be an amorphous component to each anisotropic property, e.g. birefringence. The amorphous orientation function may be determined by infrared dichroism, laser-Raman scattering or dye-doped polarised fluorescence.

AMORPHOUS POLYMER A polymer in which the molecular chains exist in the random coil conformation; since there is no regularity of structure, there is no crystallinity. Some polymers which are nominally amorphous may have some short-range order. Use of the term often implies that the polymer is amorphous in the solid state, since polymers are usually amorphous in solution or melt. An irregular conformation is adopted if the molecular structure of the polymer is irregular. Thus atactic polymers, random copolymers and thermoset polymers cannot crystallise due to molecular irregularity, and hence are amorphous. Even regular polymers, which normally crystallise, may often be quenched from the melt state to the amorphous state. Amorphous polymers exhibit a strong T_g, often with additional lower temperature, but weaker, transitions. If non-crosslinked, they are more readily soluble than crystalline polymers. They are normally isotropic (unless oriented) and homogeneous. Since they do not contain crystals to scatter light they are also transparent.

AMORPHOUS REGION A region in a crystalline polymer sample which has not crystallised and therefore in which the polymer chains exist in the random coil conformation, i.e. where the polymer is amorphous. Since crystallisation is limited in a crystalline polymer, amorphous regions are always present, typically accounting for 10–70% of the material. Thus the whole sample behaves as a 'composite' of amorphous and crystalline polymer. Both regions contribute their characteristic properties to the overall behaviour, with the amorphous regions exhibiting a T_g.

AMORPHOUS SCATTER The X-ray scattering produced by an amorphous polymer or region, consisting of a few diffuse halos. Although no short- or long-range order of a crystalline kind exists, a short-range order of the most probable distances between neighbouring atoms does exist. This is often expressed in terms of the atomic radial distribution function, obtained from the experimental scattering curve.

AMOSITE A fibrous, amphibole asbestos of structure $MgFe_6[(OH)Si_4O_{11}]_2$ (similar to crocidolite), containing a higher proportion of iron than anthophyllite. Forms fibres with a tensile strength of about 2 GPa and a tensile modulus of about 150 GPa, typically 60–100 nm wide and with good acid resistance. Sometimes used as a filler in polypropylene.

AMPHIBOLE A naturally occurring crystalline silicate with a ladder polymer structure consisting of two linked chains of alternating SiO_4^{4-} tetrahedra. The double chains are bonded to each other through planes of

CRYSTAL BRANCHING Alternative name for branched crystal.

CRYSTAL–CRYSTAL TRANSITION The transformation of one crystal structure of a polymer to a different structure. It usually results from a change in temperature, as a result of different structures being stable at different temperatures. Few examples are known in polymer crystals, but they include poly-(butene-1) and polytetrafluoroethylene.

CRYSTALLINE ORIENTATION The component of the overall orientation due to the crystalline regions of a polymer. Characterised by its orientation function, f_{cryst}, describing orientation of the crystallite axis with reference to some fixed direction, often the direction of deformation (machine direction). The angle between the two is the crystalline orientation angle, and since there are three crystallographic axes there are three such angles (α, β, ε), and therefore three distributions: $f_\alpha = (3\cos^2\alpha - 1)/2$ and similarly f_β and f_ε, any two of which may be independent. It is determined by intensity measurements of the Debye–Scherrer arcs in wide angle X-ray scattering. The separate reflections of each Miller *hkl* plane give a $\cos^2\phi_{hkl}$ term from which $\cos^2\alpha$, etc. may be calculated.

CRYSTALLINE RELAXATION A relaxation, with its accompanying transition, associated with the crystalline regions, i.e. the lamellae, of a polymer. The most important relaxation, the primary relaxation, is melting. Sometimes, in addition, a crystal–crystal relaxation and transition are observed, as with polyisoprene and polytetrafluoroethylene. Certain secondary transitions are also sometimes observed, such as premelting and even lower transitions. These may be identified with particular molecular processes, especially where considerable morphological information is available, as is the case with polyethylene. Such processes include short-range co-operative chain motions (similar to those found in amorphous regions), motions associated with defects and with chain folds and interlamellar shear.

CRYSTALLINITY The long-range (hundreds of ångströms) regular ordering of atoms or molecules in unit cells on a three-dimensional crystalline lattice. Non-polymeric solids are essentially 100% crystalline, whereas polymers only crystallise if the molecules have regular structures and then only do so to a limited extent. The extent of crystallinity is often called the degree of crystallinity (or merely crystallinity) and is typically 30–80%. The remaining material is randomly disordered (amorphous), the polymer chains being randomly coiled. The degree of crystallinity realisable decreases with increasing structural irregularity (e.g. atacticity, branching) of the polymer and varies with crystallisation conditions. Thus atactic polymers are usually completely amorphous, whereas 100% crystalline single crystals can be grown under certain special conditions. At the molecular level the crystal structure is characterised by wide angle X-ray diffraction. However, the polymer crystals (or crystallites) are very small and aggregate usually in an ordered fashion to produce different supermolecular morphologies, e.g. fibrils and spherulites. Crystallinity has a profound effect on polymer properties, especially the mechanical properties, since in the crystallites the polymer molecules are more tightly and evenly packed than in amorphous regions and hence intermolecular forces are higher. Thus as degree of crystallinity increases, so do the moduli, stiffness, yield and tensile strengths, hardness, density and softening points.

CRYSTALLISATION The process of formation of crystalline material from a disordered aggregate of molecules. This may result from cooling a melt to below the polymer crystalline melting temperature (T_m) (melt crystallisation) or from cooling or evaporating a solution (solution crystallisation). Polymer melt crystallisation requires considerable supercooling typically about 30 K. As the temperature is reduced the rate reaches a maximum then diminishes as the melt viscosity increases. Eventually the freezing of molecular motions (below the glass transition temperature) prevents any further crystallisation. Rapid quenching of a melt may prevent any crystallisation occurring. The degree of crystallinity achieved thus depends on the cooling conditions. Crystallisation may also be induced in the solid state by orientation or by annealing.

The progress of crystallisation may be followed by dilatometry, microscopic observation of spherulite growth, wide angle X-ray diffraction or differential scanning calorimetry. The rate–time plot is usually S-shaped. Both primary and secondary crystallisation stages may be observed. Analysis of the kinetics of crystallisation often follows an Avrami equation and yields information on the mechanism, especially nucleation. Nucleation is either heterogeneous due to the presence of impurities, of partially ordered polymer or of deliberately added nucleating agents, or it may be homogeneous, which arises from the random aggregation of polymer molecules to form an ordered region which subsequently grows.

CRYSTALLITE The name given to the crystals present in a crystalline polymer, which, in contrast to non-polymer crystals, are so small as to be observable only with an electron microscope. Typical sizes are 10^{-5} to 10^{-6} cm. Invariably they are of lamellar habit (lamellae) which aggregate such that each crystallite is related to its neighbour, e.g. linearly as in fibrils. The earlier fringed micelle model of a partially crystalline polymer was later replaced by the idea of highly disordered crystallites (as in the paracrystalline model). The demonstration of chain folding in polymer single crystals then led to the current view that crystalline polymers consist of aggregated lamellae, whose thickness of about 100 Å (measured by electron diffraction) is much less than the polymer molecular length (thousands of ångströms). The molecules must therefore lie across the thickness of the lamellae and be folded at the surface. The chain folds may